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The effect of screening mechanisms on black hole binary inspiral waveforms

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Scalar-tensor theories leaving significant modifications of gravity at cosmological scales rely on screening mechanisms to recover General Relativity (GR) in high-density regions and pass stringent tests with astrophysical objects. Much focus has been placed on the signatures of such modifications of gravity on the propagation of gravitational waves through cosmological distances while typically assuming their emission from fully screened regions with the wave generation strictly abiding by GR. In this talk, I will question the hypothesis of a fully screened source in gravitational wave emissions and examine the impact of screening mechanisms on the inspiral gravitational waveforms from compact sources. For that purpose, I will present the leading corrections to the GR waveform from general Horndeski theories and apply the results to the cubic Galileon model. In particular, we will see that the current sensitivity of our ground-based interferometers on the amplitude of gravitational waves is not yet sufficient to detect the deviation, supporting fully screened wave emissions. However, the predicted effect of the scalar field is not so small as to remain undetected by the future generation of detectors, such as LISA or the Einstein telescope.

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